

wherein,

*Sub B1*  
R<sup>1</sup> is a heterocyclic ring substituted with (a) four C1-4 alkyl or (b) one substituent selected from the following (i)-(xii), and the said ring may be substituted with 1 to 3 of substituent(s) selected from the group consisting of (i)-(xxiii):

(i) oxo,

(ii) C5-8 alkyl,

(iii) -COO-R<sup>5</sup> (in which, R<sup>5</sup> is hydrogen, C5-8 alkyl, C2-8 alkenyl, or C1-4 alkyl substituted with 1 to 3 of halogen or C1-4 alkoxy),

(iv) -(C1-4 alkylene)-COOR<sup>6</sup> (in which, R<sup>6</sup> is hydrogen, C1-8 alkyl, C2-8 alkenyl or C1-4 alkyl substituted with 1 to 3 of halogen),

*A1*  
*cont.*  
(v) -CO-R<sup>7</sup> (in which, R<sup>7</sup> is C5-8 alkyl, C2-4 alkenyl, carbocyclic ring, heterocyclic ring or C1-8 alkyl substituted with one substituent selected from the following (1)-(8):

(1) carbocyclic ring,

(2) heterocyclic ring,

(3) hydroxy,

(4) C1-4 alkoxy,

(5) -OCO-(C1-4 alkyl),


(6) -O-(C1-4 alkylene)-O-(C1-4 alkyl),

(7) NR<sup>8</sup>R<sup>9</sup> (in which, R<sup>8</sup> and R<sup>9</sup> each, independently, is hydrogen or C1-4 alkyl),

(8) halogen),

(vi) -(C1-4 alkylene)-CO-R<sup>10</sup> (in which, R<sup>10</sup> is C1-8 alkyl, C2-4 alkenyl, carbocyclic ring, heterocyclic ring or C1-8 alkyl substituted with one substituent selected from the following (1)-


(8):

- 
- (1) carbocyclic ring,
  - (2) heterocyclic ring,
  - (3) hydroxy,
  - (4) C1-4 alkoxy,
  - (5) -OCO-(C1-4 alkyl),
  - (6) -O-(C1-4 alkylene)-O-(C1-4 alkyl),
  - (7) NR<sup>11</sup>R<sup>12</sup> (in which, R<sup>11</sup> and R<sup>12</sup> each, independently, is hydrogen or C1-4 alkyl),
  - (8) halogen),

(vii) -CO-CO-R<sup>13</sup>,

(viii) -CO-(C1-4 alkylene)-CO-R<sup>14</sup>,

(ix) -SO<sub>2</sub>-R<sup>15</sup> (in which, R<sup>13</sup>, R<sup>14</sup> and R<sup>15</sup> each, independently, is C1-8 alkyl, C2-4 alkenyl, carbocyclic ring, heterocyclic ring, hydroxy, C1-4 alkoxy or C1-8 alkyl substituted with one substituent selected from the following (1)-(8):

- 
- (1) carbocyclic ring,
  - (2) heterocyclic ring,
  - (3) hydroxy,
  - (4) C1-4 alkoxy,

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- (5) -OCO-(C1-4 alkyl),  
(6) -O-(C1-4 alkylene)-O-(C1-4 alkyl),  
(7)  $\text{NR}^{16}\text{R}^{17}$  (in which,  $\text{R}^{16}$  and  $\text{R}^{17}$  each, independently, is hydrogen or C1-4 alkyl),  
(8) halogen),  
(x) -CONR<sup>18</sup>R<sup>19</sup> (in which,  $\text{R}^{18}$  is hydrogen or C1-4 alkyl which may be substituted with one phenyl,  $\text{R}^{19}$  is C1-8 alkyl or C2-4 alkenyl),  
(xi) C1-8 alkyl substituted with 1 to 2 of substituent(s) selected from the group consisting

*A1*  
*cont.*

of the following (1)-(7):

- (1) hydroxy,  
(2) C1-4 alkoxy,  
(3) -O-(C1-4 alkylene)-O-(C1-4 alkyl),  
(4) tetrahydropyran-2-yloxy,  
(5) -SR<sup>20</sup> (in which,  $\text{R}^{20}$  is hydrogen or C1-4 alkyl),  
(6) halogen,  
(7)  $\text{NR}^{21}\text{R}^{22}$  (in which,  $\text{R}^{21}$  and  $\text{R}^{22}$  each, independently, is hydrogen or C1-4 alkyl),  
(xii) hydroxy,  
(xiii) C1-4 alkyl,  
(xiv) C1-4 alkoxy,  
(xv) phenyl,

(xvi) phenoxy,

(xvii) benzyloxy,

(xviii)  $-SR^{23}$  (in which,  $R^{23}$  is hydrogen or C1-4 alkyl),

(xix) C2-5 acyl,

(xx) halogen,

(xxi) C1-4 alkoxycarbonyl,

(xxii) nitro,

(xxiii)  $-NR^{24}R^{25}$  (in which,  $R^{24}$  and  $R^{25}$  each, independently, is hydrogen, C1-4 alkyl or C1-4 alkoxycarbonyl, or  $R^{24}$  and  $R^{25}$  taken together with nitrogen atom to which is attached represents 5 to 7-membered saturated heterocyclic ring necessary containing one nitrogen atom and optionally further containing one nitrogen atom or one oxygen atom),

A is single bond,  $-CO-$  or  $-SO_2-$ ,

$R^2$  is hydrogen or C1-4 alkyl which may be substituted with one phenyl,

D is C1-4 alkylene or C2-4 alkenylene,

E is

1)  $-COO-$ ,

2)  $-OCO-$ ,

3)  $-CONR^{26}-$  (in which,  $R^{26}$  is hydrogen or C1-4 alkyl),

4)  $-NR^{27}CO-$  (in which,  $R^{27}$  is hydrogen or C1-4 alkyl),

5)  $-O-$ ,

6)  $-S-$ ,

7) -SO-,

8) -SO<sub>2</sub>-,

9) -NR<sup>28</sup>- (in which, R<sup>28</sup> is hydrogen or C1-4 alkyl),

10) -CO-,

11) -SO<sub>2</sub>NR<sup>29</sup>- (in which, R<sup>29</sup> is hydrogen or C1-4 alkyl) or

12) -NR<sup>30</sup>SO<sub>2</sub>- (in which, R<sup>30</sup> is hydrogen or C1-4 alkyl),

R<sup>3</sup> is

1) carbocyclic ring,

2) C1-4 alkyl substituted with carbocyclic ring,

in which, all the said carbocyclic ring and heterocyclic ring in R<sup>3</sup> may be substituted with

1 to 3 of substituent(s) selected from the group consisting of the following (i)-(xi):

(i) C1-4 alkyl,

(ii) C1-4 alkoxy,

(iii) phenyl,

(iv) phenoxy,

(v) benzyloxy,

(vi) -SR<sup>31</sup> (in which, R<sup>31</sup> is hydrogen or C1-4 alkyl),

(vii) C2-5 acyl,

(viii) halogen,

(ix) C1-4 alkoxycarbonyl,

(x) nitro,

(xi)  $-NR^{32}R^{33}$  (in which,  $R^{32}$  and  $R^{33}$  each, independently, is hydrogen, C1-4 alkyl or C1-4 alkoxy carbonyl, or  $R^{32}$  and  $R^{33}$  taken together with nitrogen atom to which is attached represents 5 to 7-membered saturated heterocyclic ring necessary containing one nitrogen atom and optionally further containing one nitrogen atom or one oxygen atom),

J is

1) -O-,

2)  $-NR^{34}-$  (in which,  $R^{34}$  is hydrogen, C1-4 alkyl which may be substituted with one phenyl,  $NR^{35}R^{36}$  (in which,  $R^{35}$  and  $R^{36}$  each, independently, is hydrogen or C1-4 alkyl), hydroxy, C1-4 alkoxy,  $-(C1-4 \text{ alkylene})-OH$ ,  $-(C1-4 \text{ alkylene})-O-(C1-4 \text{ alkyl})$  or  $-(C1-4 \text{ alkylene})-O-(C2-5 \text{ acyl})$ ),

3)  $-NR^{37}-NR^{38}-$  (in which,  $R^{37}$  and  $R^{38}$  each, independently, is hydrogen or C1-4 alkyl which may be substituted with one phenyl),

4)  $-NR^{39}-(C1-4 \text{ alkylene})-NR^{40}-$  (in which,  $R^{39}$  and  $R^{40}$  each, independently, is hydrogen or C1-4 alkyl which may be substituted with one phenyl),

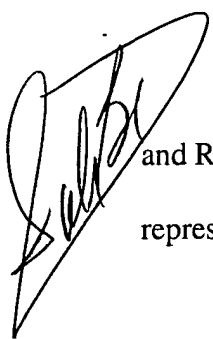
5)  $-NR^{41}-(C1-4 \text{ alkylene})-O-$  (in which,  $R^{41}$  is hydrogen or C1-4 alkyl which may be substituted with one phenyl) or

6)  $-NR^{42}-(C1-4 \text{ alkylene})-S-$  (in which,  $R^{42}$  is hydrogen or C1-4 alkyl which may be substituted with one phenyl),


$R^4$  is  $R^{4-1}$  or  $R^{4-2}$ ,

$R^{4-1}$  is

a heterocyclic ring

 or when J is  $-\text{NR}^{34}-$ ,  $-\text{NR}^{37}-\text{NR}^{38}-$  or  $-\text{NR}^{39}-(\text{C}1-4 \text{ alkylene})-\text{NR}^{40}-$ , each  $\text{R}^{4-1}$  and  $\text{R}^{34}$ ,  $\text{R}^{4-1}$  and  $\text{R}^{38}$ , and  $\text{R}^{4-1}$  and  $\text{R}^{40}$ , taken together with the nitrogen atom to which they are attached, may represent a heterocyclic ring,

in which all the said heterocyclic ring in  $\text{R}^{4-1}$ , and heterocyclic ring represented by each  $\text{R}^{4-1}$  and  $\text{R}^{34}$ ,  $\text{R}^{4-1}$  and  $\text{R}^{38}$ , and  $\text{R}^{4-1}$  and  $\text{R}^{40}$  taken together with nitrogen atom to which is attached may be substituted with 1 to 3 of substituent(s) selected from the group consisting of the following (i)-(x):

- 
- (i) C1-4 alkyl,
  - (ii) C1-4 alkoxy,
  - (iii)  $-\text{SR}^{46}$  (in which,  $\text{R}^{46}$  is hydrogen or C1-4 alkyl),
  - (iv) C2-5 acyl,
  - (v) halogen,
  - (vi) C1-4 alkoxycarbonyl,
  - (vii) nitro,
  - (viii)  $-\text{NR}^{47}\text{R}^{48}$  (in which,  $\text{R}^{47}$  and  $\text{R}^{48}$  each, independently, is hydrogen, C1-4 alkyl or C1-4 alkoxycarbonyl),
  - (ix) hydroxy,
  - (x)  $-(\text{C}1-4 \text{ alkylene})-\text{O}-(\text{C}1-4 \text{ alkyl})$ ,
- $\text{R}^{4-2}$  is  $-\text{L}-\text{M}$ ,  
 $-\text{L}-$  is  
a -heterocyclic ring-

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or when J is  $\text{-NR}^{34}$ -,  $\text{-NR}^{37}\text{-NR}^{38}$ - or  $\text{-NR}^{39}\text{-(C1-4 alkylene)-NR}^{40}$ -, each L and  $\text{R}^{34}$ , L and  $\text{R}^{38}$ , and L and  $\text{R}^{40}$ , taken together with the nitrogen atom to which they are attached, may represent a heterocyclic ring,

M is

1) carbocyclic ring,  
2) heterocyclic ring  
3) C1-4 alkyl substituted with 1 to 2 of substituent(s) selected from the group consisting of the following (i)-(ii):

*A1*  
*cont.*  
(i) carbocyclic ring,

(ii) heterocyclic ring,

4)  $\text{-O-(carbocyclic ring or heterocyclic ring)}$ ,  
5)  $\text{-S-(carbocyclic ring or heterocyclic ring)}$ ,  
6)  $\text{-NR}^{49}\text{-(carbocyclic ring or heterocyclic ring)}$  (in which,  $\text{R}^{49}$  is hydrogen or C1-4 alkyl which may be substituted with one phenyl),

7)  $\text{-O-(C1-4 alkylene)-(carbocyclic ring or heterocyclic ring)}$ ,

8)  $\text{-S-(C1-4 alkylene)-(carbocyclic ring or heterocyclic ring)}$ ,

9)  $\text{-NR}^{50}\text{-(C1-4 alkylene)-(carbocyclic ring or heterocyclic ring)}$  (in which,  $\text{R}^{50}$  is hydrogen, C1-4 alkyl which may be substituted with one phenyl or C2-5 acyl which may be substituted with 1 to 3 of halogen) or

10)  $\text{-CO-(carbocyclic ring or heterocyclic ring)}$ ,



*See 11*  
or the said carbocyclic ring and heterocyclic ring in L and M, and heterocyclic ring represented by each L and R<sup>34</sup>, L and R<sup>38</sup>, and L and R<sup>40</sup> taken together with nitrogen atom to which is attached may be substituted with 1 to 3 of substituent(s) selected from the group consisting of the following (i)-(xiv):

- A1*  
*cont.*
- (i) C1-4 alkyl,
  - (ii) C2-4 alkenyl,
  - (iii) hydroxy,
  - (iv) C1-4 alkoxy,
  - (v) -(C1-4 alkylene)-OH,
  - (vi) -(C1-4 alkylene)-O-(C1-4 alkyl),
  - (vii) halogen,
  - (viii) NR<sup>51</sup>R<sup>52</sup> (in which, R<sup>51</sup> and R<sup>52</sup> each, independently, is hydrogen, C1-4 alkyl or C1-4 alkoxy carbonyl, or R<sup>51</sup> and R<sup>52</sup> taken together with nitrogen atom to which is attached represents 5 to 7-membered saturated heterocyclic ring necessary containing one nitrogen atom and optionally further containing one nitrogen atom or one oxygen atom),
  - (ix) SR<sup>53</sup> (in which, R<sup>53</sup> is hydrogen or C1-4 alkyl),
  - (x) nitro,
  - (xi) trifluoromethyl,
  - (xii) C1-4 alkoxy carbonyl,
  - (xiii) oxo,
  - (xiv) C2-5 acyl

~~A<sup>1</sup>~~  
~~cont.~~

~~or a non-toxic salt thereof, or a hydrate thereof.~~

3. (Amended) A compound according to claim 1, in which E is -O- or -S-.

A<sup>2</sup>  
4. (Amended) A compound according to claim 3, in which R<sup>3</sup> is carbocyclic ring or C1-4 alkyl substituted with carbocyclic ring, wherein all of the carbocyclic ring may be substituted.

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5. (Amended) A compound according to claim 3, in which R<sup>3</sup> is C3-10 cycloalkyl or C1-4 alkyl substituted with C3-10 cycloalkyl, wherein all of the cycloalkyl may be substituted.

A<sup>3</sup>  
9. (Amended) A compound according to any one of claims 3 to 5, in which R<sup>1</sup> is a 5 to 15-membered mono- or bi-heterocyclic ring containing 1 to 2 nitrogen atoms and 1 to 2 oxygen atoms or one sulfur atom.

10. (Amended) A compound according to claim 1 which is:

1) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(pyridin-3-ylcarbonyl)thiazolidin-4-ylcarbonylamino)propanamide,

2) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-acetyloxymethylcarbonylthiazolidin-4-ylcarbonylamino)propanamide,

3) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(2-methoxyacetyl)thiazolidin-4-ylcarbonylamino)propanamide,

4) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-allyloxycarbonylthiazolidin-4-ylcarbonylamino)propanamide,

5) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(2-ethoxy-1,2-dioxoethyl)thiazolidin-4-ylcarbonylamino)propanamide,

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- 6) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-((4R)-3-phenylsulfonylthiazolidin-4-ylcarbonylamino)propanamide,
- 7) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-dimethylaminomethylcarbonylthiazolidin-4-ylcarbonylamino)propanamide,
- 8) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(morpholin-4-ylmethylcarbonyl)thiazolidin-4-ylcarbonylamino)propanamide,
- 9) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(3-hydroxy-3-methylbutyryl)thiazolidin-4-ylcarbonylamino)propanamide,
- A3*  
*cont.*
- 10) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(2-hydroxyethyl)thiazolidin-4-ylcarbonylamino)propanamide,
- 11) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(3-hydroxy-3-methylbutyl)thiazolidin-4-ylcarbonylamino)propanamide,
- 12) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(3-hydroxypropyl)thiazolidin-4-ylcarbonylamino)propanamide,
- 13) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-carboxymethylthiazolidin-4-ylcarbonylamino)propanamide,
- 14) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-t-butoxycarbonyl-1,1-dioxothiazolidin-4-ylcarbonylamino)propanamide,
- 15) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-t-butoxycarbonyl-1-oxothiazolidin-4-ylcarbonylamino)propanamide,

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16) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-((4S)-3-t-butoxycarbonyl-2-oxooxazolidin-4-ylcarbonylamino)propanamide,

17) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-hydroxymethylcarbonylthiazolidin-4-ylcarbonylamino)propanamide,

18) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(morpholin-4-ylcarbonylmethyl)thiazolidin-4-ylcarbonylamino)propanamide,

19) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(2-methoxyethoxycarbonyl)thiazolidin-4-ylcarbonylamino)propanamide,

*A3*  
*Cont.*  
20) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-chloromethoxycarbonylthiazolidin-4-ylcarbonylamino)propanamide,

21) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-(3,3-dimethylbutyryl)thiazolidin-4-ylcarbonylamino)propanamide,

22) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-cyclopentylcarbonylthiazolidin-4-ylcarbonylamino)propanamide,

23) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-2-((4R)-3-benzoylthiazolidin-4-ylcarbonylamino)propanamide,

24) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-((4R)-3-(3,3-dimethyl-1,2-dioxobutyl)thiazolidin-4-ylcarbonylamino)propanamide,

25) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-((4R)-2,2,5,5-tetramethylthiazolidin-4-ylcarbonylamino)propanamide,

A<sup>3</sup>  
cont.  
26) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-((2S)-1-t-butoxycarbonyl-4-oxopyrrolidin-2-ylcarbonylamino)propanamide, or

27) (2R)-N-(1-benzylpiperidin-4-yl)-3-cyclohexylmethylthio-((2S, 4R)-1-t-butoxycarbonyl-4-hydroxypyrrolidin-2-ylcarbonylamino)propanamide,  
or non-toxic salts thereof.

A<sup>4</sup>  
12. (Amended) A pharmaceutical composition comprising, as an active ingredient, an amino acid compound of the formula (I) depicted in claim 1, a non-toxic salt thereof, or a hydrate thereof.

✓  
**Please add the following new claims:**

A<sup>5</sup>  
16. A method for treating or preventing, or both, a disease induced by an excessive release of neurotransmitters from N-type calcium channels, comprising administering to a host in need of such treatment an effective amount of an amino acid compound of formula (I) depicted in claim 1, a non-toxic salt thereof, or a hydrate thereof.

17. The method according to claim 16, wherein the disease induced by an excessive release of neurotransmitters from N-type calcium channels is selected from the group consisting of cerebral infarct, transient ischemic attack, encephalomyelopathy after cardiac operation, spinal angiopathy, hypertension with stress, neurosis, epilepsy, asthma and pollakiuria.

18. A method for the treatment of pain induced by an excessive release of neurotransmitters from N-type calcium channels, comprising administering to a host in need of such treatment an effective amount of an amino acid compound of formula (I) depicted in claim 1, a non-toxic salt thereof, or a hydrate thereof.